

**Florida Red Tide Mitigation and Technology Development Initiative
Technical Advisory Council Meeting – January 17th, 2020, 9:00am-12:30pm EST**

Mote Marine Laboratory, Keating Center, New Pass Room
1599 Ken Thompson Parkway, Sarasota, FL 34236

This meeting is open to the public.

Agenda

1. Welcome, Meeting Logistics, and Agenda Overview
2. Technical Advisory Council Introductions, Role, and Setting Quorum
3. Florida Sunshine and Public Records Laws
4. Florida Red Tide Mitigation and Technology Development Initiative Overview
5. Break
6. Mote Marine Laboratory Initiative Projects
7. Public Comment and Comment Cards
8. Next Steps and Next Meeting
9. Closing Remarks

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Technical Advisory Council Meeting – January 17th, 2020, 9:00 am-12:30 pm EST**

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In Attendance: Dr. Michael P. Crosby, Dr. James Powell, Dr. James Sullivan, Dr. Katherine Hubbard, David Whiting, Kevin Claridge, Dr. Michael Barbour, Kayla Bernier, & *see additional attendees via the Sign-in Sheet included at the end of these meeting minutes.*

Presenters: Kevin Claridge, Dr. Emily Hall, Dr. Sumit Chakraborty, Dr. Cynthia Heil, Dr. Rich Pierce

Meeting Minutes:

Welcome, Meeting Logistics, and Agenda Overview

- Welcome remarks by Dr. Crosby
- Kevin Claridge reviewed the Agenda for this meeting.

Technical Advisory Council Introductions, Role, and Setting Quorum

- Technical Advisory Council – members introduced themselves
 - Dr. Michael P. Crosby – Mote President & CEO
 - Dr. James Powell – House Speaker Appointment
 - Dr. James Sullivan – Senate President Appointment
 - Dr. Katherine Hubbard – FWC Appointment
 - David Whiting – DEP Appointment
 - Governor Appointee Pending
- Kevin Claridge presented TAC statutory language.
- Kevin reviewed the TAC role per FL statutes; its role is to provide recommendations to Mote on the Initiative.
- Majority of appointed members to achieve quorum. All council members agreed.
- Questions from the Technical Advisory Council: None

Florida Sunshine and Public Records Laws

- Florida Sunshine Law
 - The Florida Sunshine Law applies to the Florida Red Tide Mitigation and Technology Development Initiative, Technical Advisory Council.

- Florida's Sunshine Law was created to protect every Floridian's right to public access of meetings and records concerning government programs, which provides transparency.
- Applies to any meeting where official acts are to be taken or public business will be discussed.
- The public must be given reasonable notice of meetings that are to occur.
- Notice of public advisory group meetings to be published in the FL Administrative Register no less than 7 days before the meeting & posted on the Initiative website.
 - Kevin stated that the TAC was noticed in the FAR on Jan 2nd.
- Minutes of meetings must be taken and documented.
 - This meeting's minutes will be posted on the Mote website.
- Advisory Boards are not required to have audio recordings of their meetings, but if a meeting is recorded by a member or staff, then it is public record.
- Any discussion between two or more members of the Technical Advisory Council discussing a topic which may foreseeably come before their board must occur in the sunshine.
 - Not restricted from socializing with other members of the Council, but may not discuss anything that may foreseeably come before the board.
- Discussion of official matters outside of a public meeting is a violation of the Sunshine Law.
- Florida Public Record Laws
 - Kevin stated that the Red Tide Initiative is subject to Florida Public Records Laws.
 - Public Records are ALL documents, papers, letters, maps, books, tapes, photographs, films, sound recordings, data processing software, etc. regardless of the physical form...or means of transmission made or received in connection with official action of an agency. Sec. 119.011(12), F.S.
 - Public records must be open and available for the public to inspect and copy. This includes emails, text messages, and social media.
- Questions from the Technical Advisory Council: None

Florida Red Tide Mitigation and Technology Development Initiative Overview

- Florida Red Tide Background
 - To ensure everyone in attendance was on the same page, Kevin provided background of the Florida Red Tide Mitigation and Technology Initiative.
 - Annual Florida occurrence
 - Impact varies in size and duration
 - Can be skin, eyes, and respiratory irritant
 - Can affect marine biota and the environment
 - Forecasts, Reporting, Monitoring, and Maps:

- Federal/State/Local Governments, Mote, Universities
 - Satellite imagery, cell concentrations, wind, public and business observations
 - Beach Conditions Reporting System
 - Aquaculture closures and fish kills
- Initiative Overview
 - Signed into law by Florida Governor DeSantis in June 2019
 - 379.2273 Florida Statutes
 - Partnership with FWC Fish and Wildlife Research Institute
 - \$18 million over 6 years contracted by FWC-FWRI to Mote
 - Legislative intent:
 - develop prevention, control, and mitigation technologies and approaches to address the impacts of red tide on coastal environments and communities in Florida
 - Year one has three parts:
 - Infrastructure at Mote - culture lab and mesocosm areas for:
 - Mote led mitigation and technology development projects
 - Partner led mitigation and technology development projects
 - Established Initiative Administrator and Administrative Support
 - Executed state contract between FWC and Mote
 - Council appointments and meeting
 - Outreach: press releases, speaking events, conferences, meetings, forums, partner newsletters, webinar, DEP Protecting Florida Together website, and the Mote Red Tide Initiative website:
 - <https://mote.org/research/program/Florida-Red-Tide-Mitigation-and-Technology-Development-Initiative>
 - Partner institutions
 - Initiative progress
 - Initiative Technology Advisory Council
 - Requests for proposals
 - Reports
 - Contact
 - Quick links: Forecasts/current conditions
- Initiative Reporting Requirements
 - Beginning January 15, 2021, and each January 15 thereafter until its expiration, the initiative shall submit a report that contains an overview of its accomplishments to date and priorities for subsequent years to the Governor, the President of the Senate, the Speaker of the House of Representatives, the Secretary of Environmental Protection, and the executive director of the Fish and Wildlife Conservation Commission.

- Annual Workplans, Reports, and Invoices to FWRI
- Website, Public Records, and Meeting Minutes
- Initiative Engagement
 - Mote will facilitate funding engagement (as stated in Initiative statute):
 - Leverage state funds with private and federal funds
 - Mote may use a portion of appropriation to fund other marine science and technology development organizations in Florida and around the world to pursue applied research and technology
- Request for Partner Proposals
 - Open to any/all interested parties
 - Anticipated grant funding in year one is \$1M
 - Likely \$150-\$250K for each grant, 4-5 organizations
 - Support not to exceed 1 year - may request longer in second year RFP
 - Proposal guidelines and to submit a proposal:
 - Mote.org
 - Announced November 7th at US HAB Symposium
 - Mote sponsored the Symposium
 - Announced RFP to 300+ attendees
 - Initiative outreach table all week
 - 12 Mote Research Presentations and Posters
 - Due January 31st to proposals@redtidemtdi.org
 - Webinar on RFP and to answer any questions next week
 - Notification of Awards in March
 - Core infrastructure developed at Mote for projects
 - Use of Mote facilities/infrastructure is encouraged
 - Panel of scientists review
 - NOAA, EPA, FWC, DEP, and University scientists
 - Each scientist will review 3-5 proposals using provided questionnaire
 - Projects will be selected by Mote and presented to TAC in April
- Questions from the Technical Advisory Council:
 - Dr. Sullivan asked if \$1M will be consistent in years to come. Dr. Crosby stated that Year 1 would be for initial investment in infrastructure.
 - Dr. Sullivan asked how the proposal reviewers are going to score. Merit-based, chosen by Mote? Kevin stated that it would be qualitative, not by a ranking. Meeting criteria. Afterwards, recommendations would be passed to Dr. Crosby for consideration and confirmation.
 - Dr. Hubbard asked if a consolidated list of infrastructures would be available to those applying for RFP's. Kevin stated that Mote will clarify Mote's infrastructure availability on the website as soon as construction nears completion. Can add more to next RFP for what can be utilized. Dr. Crosby stated that it is important

- to provide these details and also suggested that Kevin and team would provide a schedule of use for the infrastructures, so scientists can schedule ahead of time.
- Dr. Powell asked if there would be bench charges for use of the infrastructures. Kevin stated it would largely be free of charge. Dr. Crosby added that they would be free for use on projects under this Initiative. There will be a staffing plan to ensure these are maintained and supported as free of charge. Kevin added that at the next meeting tentatively in April, Mote would bring pictures of the success of the infrastructure being built.
 - Dr. Hubbard asked if infrastructure was purely for Mote projects. Kevin stated that it would be internal and partner-led.
 - David Whiting restated that the TAC wouldn't be involved in the RFP proposal. Kevin said that is correct, Mote will present the projects selected in April for council comments and questions. Mr. Whiting asked what Mote needs from the TAC on that process. Kevin replied that the TAC is to provide overall guidance and to ensure the process is being conducted effectively.

Mote Marine Laboratory Year 1 Projects

- Mote Led Project Overviews
 - Facilities
 - Mesocosm Facility
 - Culture Facility
 - Technology Development in Support of Mitigation
 - Programmable Hyperspectral Seawater Scanner (PHySS)
 - UAV (Unmanned Aerial Vehicle, Drone) -based Detection System
 - Beach Conditions Reporting Systems (BCRS)
 - Quantitative Polymerase Chain Reaction (qPCR)
 - Mitigation Projects
 - Compounds (Natural, Clay, Chemicals)
 - Laboratory and Mesocosm
 - Collaboration with Partner Led Projects
 - Coordination with other funding sources
- Experimental Mesocosm Facility – Dr. Emily Hall
 - Motivation:
 - To build a multi-scale, multi-user red tide research infrastructure for Initiative scientists.
 - Goals:
 - Used by visiting scientists, graduate students, educational groups, and in-house scientists.
 - Ability to perform land-based mesocosm studies on red tide.
 - Outcomes:

- Enable the development of innovative technologies and approaches that are critically needed to address control and mitigation of red tide impacts.
 - Dedicated red tide mitigation mesocosm facility will allow more ecosystem-based testing of mitigation compounds in a controlled setting, reduce the need to postpone research or shorten experimental designs due to lack of available space and enable year-round, longer, multiple-use studies.
- Questions from the Technical Advisory Council:
 - David Whiting asked if this would be a wholly new system. Dr. Hall's response was, yes.
 - Dr. Sullivan asked if there would be precautions such as Biosafety Level 1/Biosafety Level 2 ventilation. Dr. Hall's response was, yes. Dr. Crosby added that it was a conscious decision to build the infrastructure far away from the marine ecosystem to avoid any accidental contamination.
 - Dr. Sullivan asked how the facility was planning to manage disposal. Dr. Hall's response was via UV sterilization & other options. They have been researching to ensure they utilize the best filtration and cleanup process.
 - Dr. Hubbard asked if the goal was to have the infrastructure available for the 1st round of RFP's. Dr. Hall stated that the goal was to have it completed by June.
- Phytoplankton Culture Facility – Dr. Emily Hall
 - Motivation:
 - To support the Initiative with *Karenia brevis* culture
 - Goals:
 - Meet the demands of the mitigation research with consistent and reliable production of large volumes of *K. brevis*
 - Expand collection of *K. brevis* species (growing and maintaining several different strains)
 - Outcomes:
 - Leverage Mote's strong foundation of ecology, advanced biology and physiology to collaborate at state, national, & international levels and improve scientific productivity – i.e. support this Initiative with culture and Red Tide expertise.
- Questions from the Technical Advisory Council:
 - Dr. Sullivan asked if it would be if culture would be available to offsite research. Dr. Hall's response was, yes.
 - Dr. Hubbard asked if a service or set up as cost would be charged. Dr. Crosby stated that if not part of initiative there would be a cost.

- Dr. Hubbard asked if large scale would be available. Dr. Crosby asked the TAC if they agreed that that would be helpful. Should TAC discuss if that is good thing, bad thing, etc.? Initiative is the #1 priority though.
- Dr. Sullivan stated that the more available to scientists at large, the better.
- Dr. Hubbard asked if, for some of these projects, they were thinking about the sustainability of them. Do they plan for that? Dr. Crosby stated that the infrastructure should be maintained as an asset to be used beyond this initiative.
- PHySS – Programmable Hyperspectral Seawater Scanner – Dr. Sumit Chakraborty
 - Motivation:
 - Develop an instrument to aid in the mitigation of red tide and provide early detection and warning
 - Developed at Mote; Similarity Index; fully programmable data acquisition with web-based data analysis tool
 - Goals:
 - Develop a spectral library of different phytoplankton groups with variable morphologies and physiological states, optical signatures will be obtained for a range of cell densities.
 - Improve sensitivity, identify multiple phytoplankton groups.
 - Achieve concurrence with direct and remote observations of the SI estimates across different biological and physical regimes.
 - Outcome:
 - To form observatory providing continuous high frequency data
 - Data will be made publicly available in web based platform
- Questions from the Technical Advisory Council:
 - Dave Whiting asked what the intent of the library was. Wirelessly communicating back? Dr. Chakraborty agreed.
 - Dr. Sullivan asked if there would be comparisons between commercially available ones and if it works under water. Dr. Chakraborty's response was, yes. Dr. Sullivan asked if it would be combined with above water views. This conversation segued to the next slide.
- UAV-based Red Tide Detection System – Dr. Sumit Chakraborty
 - Motivation:
 - Patchy nature of red tide makes mitigation technology challenging.
 - Airborne hyperspectral sensors could allow the mapping of HABs with a high spatio-temporal resolution at local (drone) and regional (satellite) scales.
 - Goals:
 - Conduct shore-based flights in local waters
 - Collect hyperspectral data

- Develop data processing scheme, instrument calibration and deliver proof-of-concept
 - Quality control check of algorithm performance
 - Implementation of new approaches for algorithm development
 - Outcome:
 - Develop an application tool to assist in management of events that may involve significant risk to the public.
 - Decrease costs of detection, improve mitigation application
- Comment from the Technical Advisory Council:
 - Dr. Hubbard stated that it may be helpful to focus more on functional groups vs species and that the wording of “species” is confusing.
- Advance Red Tide Reporting Technology – Dr. Cynthia Heil
 - Motivation:
 - Alert the Public of Red Tide and its effects and minimize economic impacts to Florida.
 - Put red tide reporting technology in the hands of fisherman – coastal and offshore.
 - Goals:
 - Update/combine the Beach Condition Reporting System with the Citizen Science is Cool App.
 - Enhance validation components (thumb up/down), pictures, amenities, and alerts for blooms and reporting.
 - Bloom Zoom for cell detection, App for Chl-a
 - Outcomes:
 - Information is disseminated to BCRS/App, GCOOS, SECOORA, and NOAA & State agencies.
 - Reporting to/by Anyone With a Cell Phone, Anywhere.
- Questions from the Technical Advisory Council:
 - Dr. Sullivan asked if different from FWC’s. Dr. Heil’s response was, yes.
 - Dr. Sullivan asked if it would be finer and how often it would be updated. Dr. Crosby stated that it would be extended to the East coast.
 - Dr. Powell asked if we think tourists are using to making decisions on go or no go? Dr. Crosby thinks sites such as VisitFlorida and others may have already been looking into. Dr. Heil stated not just public using; local businesses using as well.
 - Dr. Hubbard asked if we plan on media to show what has happened before or to see prior reports. Dr. Crosby stated it’s currently not, but would be a good thing to do. There are a number of others interested in adding to it. He said the suggestion on trend analysis is a great one.

- Acceleration of user-friendly, smart phone integrated qPCR technology development and Citizen Science integration for *K. brevis* mitigation testing – Dr. Cynthia Heil
 - Motivation:
 - Meet the ongoing, well-defined, need for new public-friendly, automated, web-interfaced detection methodologies that can provide accurate and timely cell monitoring data.
 - Goal:
 - Accelerate the development and validation of a hand-held, qPCR based *K. brevis* and *K. mikimotoi* detector (Biomeme Three3) and develop protocols for integration into Citizen Science program.
 - Outcomes:
 - Develop cell-based DNA standards from Gulf *Karenia* cultures,
 - Validate efficacy of existing *K. brevis* and *K. mikimotoi* primers for use on the Biomeme Three9 simultaneously in a single reaction,
 - Provide training to Mote personnel on use of qPCR technology, and
 - Establish pipeline/protocols for linking and cross-calibrating cloud-based qPCR data to existing Citizen Science databases.
- Mitigation Products & Processes – Dr. Rich Pierce
 - Motivation:
 - To build on advancements made through the on-going FWC-Mote Cooperative Red Tide Research Program to develop science-based response strategies to reduce the intensity of red tide events and mitigate impacts on coastal ecosystems, Florida's economy, and public health.
 - Goal:
 - To develop, test and implement the most effective and ecologically sound products and technologies for mitigation and/or control of adverse impacts of Florida Red Tides, in collaboration with experts from multiple external research institutions.
 - Outcomes:
 - Implement a tiered approach to investigate products in a science-based protocol to identify the most effective and ecologically sound products and technologies for mitigation and/or control of adverse impacts of Florida Red Tides.
 - Tier 1. Lab-scale tests to determine the effective methodology for eliminating *K. brevis* cells and toxins.
 - Tier 2. Mesocosm-scale (larger volume, multiple organisms) to assess impacts of non-targeted marine organisms and water quality

- Tier 3. Open Field applications: Test the most appropriate method(s) under natural field conditions (timing depends on outcome of previous tests, permission for field application and red tide events).
 - Potential Mitigation Products:
 - Natural Products
 - Macro Algal Allelopathy; Barley straw extract
 - Bacteria, Parasites, Viruses
 - Chemical Products
 - Commercial algicides; Enzymes; Ozone; Bleach
 - Surfactants-emulsifiers; Hydrogen peroxide
 - Physical Processes
 - Clay; Nano-bubbles; UV-C radiation
 - Parameters Monitored:
 - Water Quality: DO, Temp, pH, PSU, CDOM, Nutrients
 - Red Tide cells and Tide Toxins
 - Phytoplankton Community Composition
 - Impacts/Toxicity to Marine Biota
 - Mortality; Growth; reproduction
 - Cellular function
- Questions from the Technical Advisory Council:
 - Dave Whiting stated that a goal of the HAB taskforce is getting a handle on regulatory application of these tools. If some of these involve natural/biological compounds, might want to make more linear for those; come up with framework for how we verify something meets our threshold, so it can be used. Regulatory aspect doesn't move quickly; need to find how to make it move more smoothly. A step-wise process could help. Dr. Pierce stated they can do it with the clay because it had already been done. Also, the ozone study in Boca Grande; a lot of information to apply, but still had to get permission from state and Army Corp of Engineers.
 - Dr. Sullivan stated that with the Blue Green taskforce, scalability was an issue and may be for you. Some coordination with other taskforces may help you or eliminate going down roads that are wasting funds. Dr. Sullivan asked how much money is going through the different projects. Kevin stated about \$1M for in-house Mote projects; Mesocosm and Culture facilities we cost approximately \$750-850K. Dr. Sullivan asked if funded at level similar to what external partners would get? Dr. Crosby stated leveraging not just local/state, but Mote has also secured philanthropic dollars.

Additional Comments/Questions from the TAC:

- Dr. Crosby stated the intent is always to not harm further than what Red Tide has already done. Rather, develop a toolbox of multiple technologies applied at different times and conditions and locations. The combination helps to achieve the ultimate goal of decreasing the environmental impacts of Red Tide.
- Dr. Sullivan stated that you have to know where Red Tide is and the science behind trying to stop it early. Invest in those technologies that let you rapidly assess at low concentrations and technology that allows monitoring at different depths and finding out where blooms begin. This can help apply mitigation techniques while it's still very small.
 - Dr. Crosby agreed with Dr. Sullivan. He stated that forecasting/modeling must be improved to be at the same level of intensity as hurricane forecasting. Not part of this initiative, but need to partner closely with ongoing research and monitoring programs aimed at improving this area. The Holy Grail is to identify the initiation point as its coming in, have an accurate forecast on whether it will be a significant event, and deploy technology to decrease likelihood of it ever achieving that impact. This will take combined strategic coordination.
- Dr. Hubbard asked if the goal for the projects were to be multiyear. Kevin's response was, yes depending on appropriation. Dr. Hubbard stated knowing how difficult it is to receive funds, a chance to look at longer term of research would be beneficial. Dr. Crosby stated that it's not guaranteed every year, but having a 6 year commitment is a game changer. He also added that year-end progress and success would be evaluated to decide on the next year's funding for projects.
- Dr. Sullivan asked if the TAC was going to be asked to review progress and if that progress would be provided to the State? Kevin stated that reporting would be sent to Governor, House, Senate, & agencies on progress and that all along the way they'll be asking for recommendations/advice from the TAC.
- Dr. Powell had a question regarding proposals for external projects; 1 year with potential to continue for 2 years; sometimes takes a year to almost ramp up; will that always be the case or opportunity for research to continue for entire 6 years? Kevin's response was that it would be depending on state appropriation and government support each year.
 - Dr. Sullivan asked if it was to be re-appropriated every single year. Kevin said yes, it is in FWC's budget.
 - Dr. Powell asked if can only commit for each year. Kevin said technically yes.

Public Comment and Comment Cards: None

Next Steps and Next Meeting

- Jan 31st proposals are due. Looking at April 3, 10, or 24. Kevin will send a doodle poll to the TAC members to see which date works best.

Closing Remarks

- Dr. Crosby thanked everyone for the time commitment and stated that the comments were very helpful.

Adjourned - 10:45 am

A copy of the PowerPoint Presentation can be provided by contacting Kevin Claridge at kclaridge@mote.org.

Sign-in Sheet

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Name:	Organization:	Email Address: (if you want to be contacted about future Initiative events)
David Whiting	FDEP	
Jim Sullivan	FAU	jsullivan@fau.edu
Emily Hall	Mote	
Curdy Heil	Mote	
Stephanie Kettle	Mote	
James Powell	CMIA	jpowell@cmiaquarium.org
Richard Puri	Mote	rich@mote.org
W.P. [unclear]	MOTE	mcross@MOTE.org
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Kate Hubbard	FWC	Katherine.hubbard@myfwc.com
Meghan Abbott	FWS	
Hayley Rutz	Mote	hrutz@mote.org
J. D. HELMS		jdhelms5420@gmail.com

Sign-in Sheet

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Name:	Organization:	Email Address: (if you want to be contacted about future Initiative events)
Eria Strom		stromcross@gmail.com
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William Johnson		
Bonnie Harbin		
Andria Pokorz	Mote	
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